IN THE SPECIFICATION

Please replace the paragraph spanning pages 4 and 5 with the following amended paragraph:

In order to achieve the first object, according to the present invention, there is provided an electrophoresis apparatus comprising a planar plate formed therein with a channel for ~~eletrophoretic~~ electrophoretic separation, a light irradiating means for irradiating an excitation beam into a detection part formed in a part of the channel, a fluorescence detecting means for detecting a degree of fluorescence which is generated from a sample by the excitation beam, the channel having a rectangular cross-sectional shape and being composed of a top surface and a bottom surface which are parallel with the surface of the planar plate, and left and right side wall surfaces, a first incoming window which is flat and smooth and which is formed in the bottom surface of the ~~cannel~~ channel in the detecting part, for introducing the excitation into the channel, a second flat and smooth incoming window which is formed on a surface of the planar plate which is opposed to the first incoming window, an excitation transmission path formed between the first and second incoming windows, a first outgoing window formed in one of the side wall surfaces of the channel and a second outgoing window formed in a side surface of the planar ~~palate~~ plate at a position opposed to the first outgoing window, and a fluorescent transmission path between the first outgoing window and the second outgoing window.

Please replace the paragraph spanning pages 5 and 6 with the following amended paragraph:

In order to achieve the second object, according to the present invention, there is provided an electrophoresis apparatus comprising a plurality of flat plates each formed therein with a capillary channel and each having the same configuration as the above-mentioned planar plate, which are layered one upon another so that the channels in the planar plates are overlapped with one another, a light beam irradiating means for irradiating a single excitation beam, which is provided at a position where the light beam goes through the capillary channels in the plurality of planar plates, at the same time, and fluorescence detecting means located at positions in extension of outgoing windows formed in side surfaces of the planar plates.

Please replace the paragraph spanning pages 7 and 8 with the following amended paragraph:

Referring to Fig. 1 which is a perspective view illustrating a channel substrate in an electrophoresis apparatus in an embodiment of the present invention, a planar plate 10 is formed therein with sample channels 20, a separation channel 21, solution reservoirs 30, a sample reservoir 34 and the like. A detecting part 21b is formed, intermediate of the separation channel 21. The separation channel 21 has a bottom part formed therein with an incoming window through which a light beam can be readily introduced into the detecting part 21b from an excitation light source 900. One side wall of the separation channel [[1]]21 is formed therein with a first smooth outgoing window 5a through which light can readily be led into the planar plate 10,

and a fluorescence transmission path 6b for transmitting fluorescence toward one side of the planar plate 10 while preventing the fluorescence from leaking is extended from the first outgoing window 5a to the one side of the planar plate 10, and is terminated with its output part at one side of the planar plate 10, where a ~~smooth~~ second smooth outgoing window 5b is formed. Further, a fluorescence detector 910 is arranged on the outside of the second outgoing window 5b.

Please replace the paragraph on page 9, lines 5-20, with the following amended paragraph:

The windows 5a, 5b are configured so that the thickness of the upper and lower parts of the substrate formed therein with the channels becomes thinner in these parts than in other parts. An air space is defined in the vicinity of the one side wall of the channel within a part where the first outgoing window 5a is formed, so as to serve as [[an]]a window, and the second outgoing window 5b has a shape such as to be recessed inward from the one side wall of the planar plate 10, in comparison with the other part thereof. Further, the fluorescence transmission path 6b is also formed on opposite sides with air spaces. It is noted that a rod-like fiber or the like may be embedded in the planar plate 10 on the outgoing side of the planar plate 10 at the time of forming the separation channel 21 and the like.

Please replace the paragraph spanning pages 8-9 with the following amended paragraph:

The solution reservoirs 30 and the sample reservoir 34 are inserted therein with electrodes, that is, first and second sample introducing electrodes 71, 72, and

third and ~~forth~~ fourth sample separating electrodes 73, 74. A light converging lens 41 is provided between the outgoing window for the detection part and the separation channel 21. It is noted that a cover ~~substrate mage~~ of a transparent planar plate (which is not shown) is provided on the top of the planar ~~palate~~ plate 10 formed therein with the channels although Fig. 1 shows such a condition that the top side of the planar plate 10 is opened.

Please replace the paragraph on page 9, lines 5-7, with the following amended paragraph:

The operation of the electrophoresis apparatus having the above-mentioned configuration will be described hereinbelow ~~explained~~.

Please replace the paragraph spanning pages 9-10 with the following amended paragraph:

A separation medium solution is poured in the solution reservoirs 30 until both sample channel 20 and separation channel 34 are filled therein with the solution. A sample is, at first, dripped into the sample reservoir 34 and thereafter a voltage is applied between the first and second electrodes 71, 72 at both ends of the sample channel 20 so as to produce an electrical field in the channel 20. The electrical field is effected so as to cause electrophoresis of the sample until the leading end of the sample comes to a position downstream of a channel crossing part 21a. Then, a voltage is applied between the third and fourth electrodes 73, 74 at both ends of the separation channel 21 so as to introduce the sample from the channel crossing part 21a into the separation channel 21 in order to initiate the separation of the sample.

The sample is separated into components due to electrophoretic speeds which are different from one another among the components while the sample is led to a detecting part 21b. An excitation beam 90 is irradiated to the detecting part 21b from the excitation light source 900. Fluorescence 91 which is emitted from the sample in response to the excitation beam 90 is transmitted through the fluorescence outgoing window 5a, the fluorescence transmission path 6b and the fluorescence outgoing window 5b, and is received by the detector. There may be used a laser, a light emitting diode, a halogen lamp or the like for the excitation beam. As to the detector, an array of photo-sensors for obtaining signals from respective channels, a cooled type CCD camera having pixel elements for obtaining fluorescent signals from channels in a wide range or the like may be used, which is selected in view of a kind of a sample, and a wavelength.

Please replace the paragraph on page 11, lines 10-16, with the following amended paragraph:

In this embodiment, the light transmission path which is transparent is provided in a part of the planar plate 10. However, the planar plate 10 may be made of a transparent material in its entirety. With this configuration in which the planar plate 10 is made of the transparent material, a part in the planar plate 10 itself can serve as the light transmission path.

Please replace the paragraph spanning pages 11-12 with the following amended paragraph:

Explanation will be made of a method of manufacturing the electrophoresis substrate with reference to Fig. 2 which shows a mold for forming the electrophoresis substrate shown in Fig. 1. Referring to Fig. 2, the mold is composed of a first plate 110 having a frame 110a and provided with a rectangular male die 200 for forming the capillary channels, and a female die 400 for forming the fluorescence converging lens and the first and second fluorescence outgoing window, and a second plate [[102]]120 provided with a male die 300 for forming the sample reservoir and solution reservoirs. The second plate 120 is fitted in the frame 110a of the first plane 110 when the substrate is molded. These plates may be formed by cutting metal stocks, or etching single crystal silicon plates. Further, the male and female dies may be formed on planar plates by electric spark machining. Further, deep groove-like resists are formed by X-ray lithography, and are then subjected to Ni-plating so as to form nickel structure members after the resists are removed, and the thus formed structure members may be used for the mold.

Please replace the paragraph spanning pages 15-16 with the following amended paragraph:

The operation of the above-mentioned configuration will be hereinbelow explained. A plurality of positions to which an excitation beam is irradiated, such as irradiation points 26a, 26b, 26c, 26d, are provided in the separation channel 21. Emissions 91a, 91b, 91c, 91d of fluorescence from these irradiation points 26a, 26b, 26c, 26d, are detected respectively by detection parts 910a, 910b, 910c, and 910d

on the fluorescence detector [[90]]910. As to the excitation source 900 and the fluorescence detector 910, there may be used those explained in the previous embodiment.

Please replace the paragraph spanning pages 16-18 with the following amended paragraph:

Fig. 7 shows another variant form of the embodiment according to the present invention. In this variant form, the electrophoresis substrates each of which is shown in Fig. 1 are stacked one upon another in multi-stages. In each planar plate 10, there are provided a sample channel 20, a separation channel 21, solution reservoirs 30, a sample reservoir 34, an excitation focusing lens 41, a fluorescence collecting lens 51, a spatial filter 52 and grating 53. In this variant form, although the planar plates are layered in three stages, they may be layered up more than three stages, and as well they may be layered up two stages. The planar plates are layered one another so as to obtain a channel assembly 1000. The excitation beam 90 can be simultaneously irradiated to the separation channels 21 in all planar plates. The solution reservoirs 30 having three in each of the planar plates are formed, piercing through all planar plates. With this arrangement, separation medium is poured into the topmost solution reservoirs 30 so as to fill the separation medium in the sample channels 20 and the separation channels 21 in all planar plates. Further, the solution reservoirs 30 serve as holes for receiving electrodes 72, 73, 74, respectively. The planar plate 10 at each stage is cut off while a part having a predetermined length, for example, y1, y2 or y3 in the direction of the separation channel 21 and a predetermined length, for example, x1, x2 or x3 in the direction of

the sample channel is left in the planar plate. The length X of the cut-off part is uniform among the planar plates layered in the three stages. The distance by which the fluorescence 91 advances through the planar plate is different by the length X among the planar plates layered in three stages, and accordingly, the attenuation and scattering of light can be reduced. The lengths y1, y2, y3 become longer and longer one by one in the mentioned order, and accordingly, the respective sample reservoirs 34 are not extended through all planar plates but are independent from one another among the planer plates layered in several stages. That is, the positions of the sample reservoirs are shifted from one another in the direction y among the planar plates. It is noted that the separation passages 20 formed in the respective planar plates have lengths which are equal to one another. With this configuration, the sample reservoirs 34 can be inserted therein with the respective electrodes 71, and can be filled therein with the sample.

Please replace the paragraph spanning pages 18-19 with the following amended paragraph:

Referring to Fig. 8 which shows the configuration of the electrophoresis apparatus according to the present invention, a planar plate assembly 1000 composed of planar plates each of which is shown in Fig. 7, and which are layered one another in several stages, is set on a planar base 1700. A titer plate 81 in which several wells 82 reserving therein samples extracted from several specimens are arrayed is set in an automatic sampler 2300. The samples are dripped into the sample reservoirs 34 in the planar plate assembly 1000 by means of sample nozzles 2400 in the automatic sampler [[2400]]2300. Electrode wires from an electrode

assembly 1100 are inserted into the planar plate assembly 1000. An excitation beam from the excitation source 900 is irradiated to the planar plate assembly 1000 in a direction perpendicular to the latter by means of a miller 1800, and fluorescence from the separation channels in the planar plates is detected by a fluorescence detector 910.

Please replace the paragraph spanning pages 19-20 with the following amended paragraph:

Fig. 9 shows a further another variant form of the embodiment of the present invention. In this variant form, several sample channels 20 and separation channels 21 are arrayed in a matrix-like pattern within the planar plate 10. Exciting light converging lenses 41 are provided in the vicinities of side surfaces of the respective separation channels 21 in the planar plate 10, and fluorescence converging lenses 51 are provided for introducing fluorescence from respective samples, outside of the planar plate 10.

Please replace the paragraph spanning pages 21 and 22 with the following amended paragraph:

Since the electrophoresis apparatus according to the present invention comprises a planar plate formed therein with a capillary channel for ~~eletrophoretic~~ electrophoretic separation, a light irradiating means for irradiating an excitation beam into a detection part formed in a part of the capillary channel, a fluorescence detecting means for detecting a degree of fluorescence which is generated from a sample by the excitation beam, the capillary channel having a rectangular cross-

sectional shape and being composed of a top surface and a bottom surface which are parallel with the surface of the planar plate, and left and right wall surfaces, a first flat and smooth incoming window formed in the bottom surface of the capillary channel, for introducing the excitation bean into the channel, a second flat and smooth incoming window formed on a surface of the planar plate which is opposed to the first incoming window, for introducing an excitation beam into the planar plate, an excitation transmission path formed between the first and second incoming windows, a first flat and smooth outgoing window formed in one of the side surfaces of the of the channel, for emitting fluorescence from the sample, and a second flat and smooth outgoing window formed in a surface of the planar palate at a position opposed to the first outgoing window, for emitting the fluorescence outside of the planar plate, and a fluorescent transmission path between the first outgoing window and the second outgoing window, there may be provided an electrophoresis apparatus which can reduce background light and stray light so as to enhance the detection accuracy.